



Effects of the Vernon Springs Dam Modification on Fishes in the Turkey River, Iowa.

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Iowa DNR Fisheries Research



Background

Fish movement studies in Iowa have identified critical habitats for some fish species and revealed the importance of seasonal movements of fishes between these habitats.

Results of these studies suggest that the modification or removal of barriers to fish movement has the potential to improve fish populations in Iowa's rivers.

Recent interest by dam owners in reducing liability for accidents and repairs of aging low-head dams provides opportunity to quantify the effects of dam modification/removal on river fish communities.

Response of fish and habitat to stream rehabilitation practices in Iowa's interior rivers and streams.

Goal: Develop management guidelines for use of stream rehabilitation practices to improve river and stream habitat and fishing opportunities for Iowa anglers.

Vernon Springs Dam (Turkey River) – Conversion to rock-arch rapids

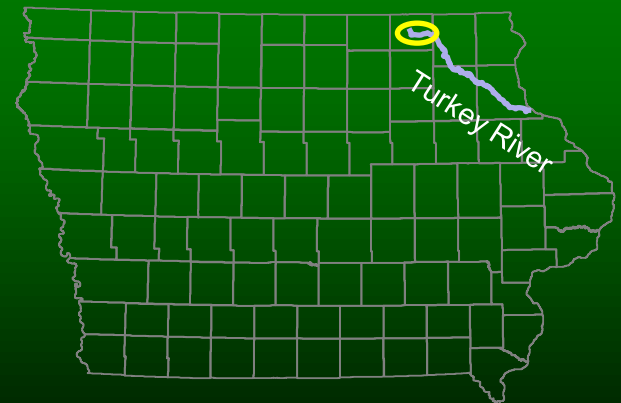
Rockford Dam (Shell Rock River) - Removal

Manchester Dam (Maquoketa River) – Partial removal with whitewater and habitat improvements.



VERNON SPRINGS DAM TURKEY RIVER CRESCO, IOWA

250 feet long
8 feet high



VERNON SPRINGS IMPOUNDMENT
35 SURFACE ACRES



**VERNON
SPRINGS
DAM**

Vernon Springs Dam Modification

Dam Owner: Howard County Conservation Board

Project Goal: Eliminate re-circulating currents that contributed to past drownings while maintaining water elevation for a popular lake.

Expected Fisheries Benefit: Re-establish fish passage between the Turkey River downstream of the dam and the upper watershed and impoundment.

Partners and Project Cost

Iowa DNR Dam Mitigation Program	\$128,279
USFWS Fish Passage Program	\$90,000
Iowa DNR – Fish Habitat Grant	\$50,400
Cresco Bank and Trust	\$10,000
Cresco Union Bank	\$3,000
National Fish and Wildlife Foundation	\$31,500
Total Project Cost:	\$313,179

Project Design and Construction

Luther Aadland -Concept design and
initial construction supervision

Iowa DNR Rivers Team and DNR Engineering –
Final design and Construction details

Bruening Rock Products - Contractor



**CONSTRUCTION BEGINS 2ND
WEEK OF JULY 2010**







Completed August 10, 2010



August 2014

Vernon Springs Dam Modification Fisheries Evaluation



Study Goals

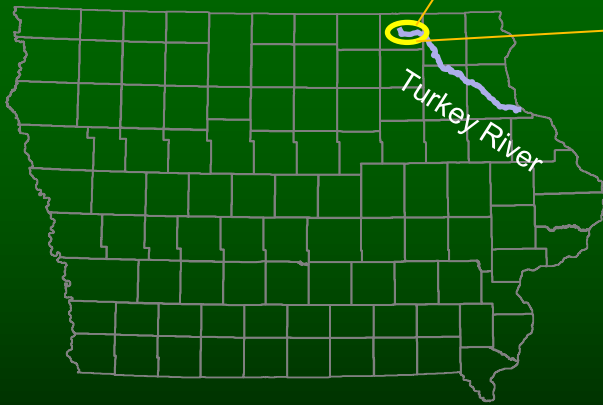
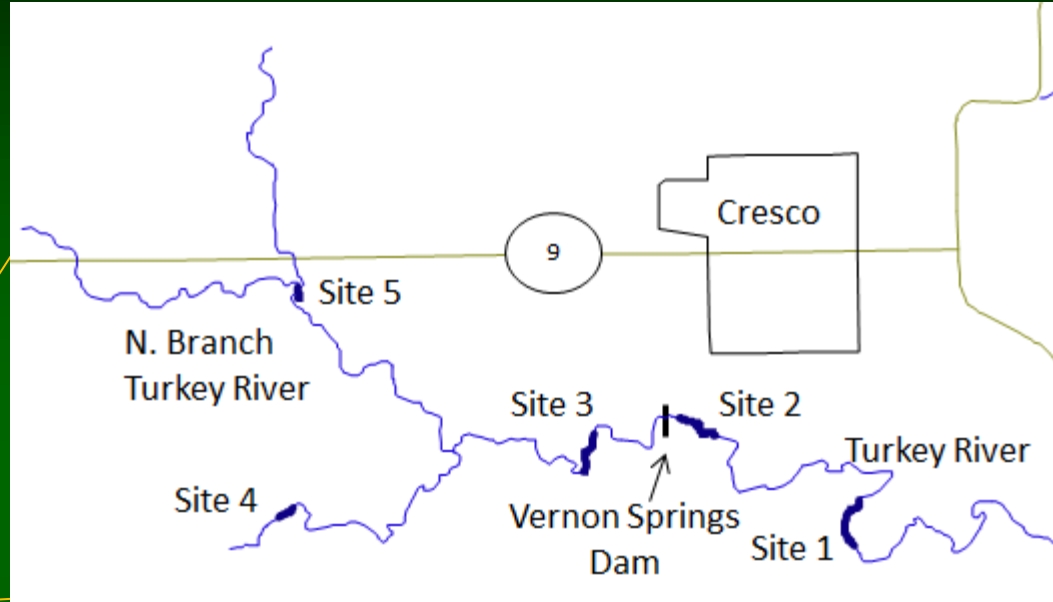
Document upstream fish movement over the structure.

Quantify changes in Turkey River fish community upstream of the structure.

Study Area

Drainage Area (mi.²)

- Site 1 – 87
- 2 – 80
- 3 – 75
- 4 – 25
- 5 – 35



Distance sampled (feet)

- Site 1 – 2880
- 2 – 2460
- 3 – 2230
- 4 – 1120
- 5 – 940

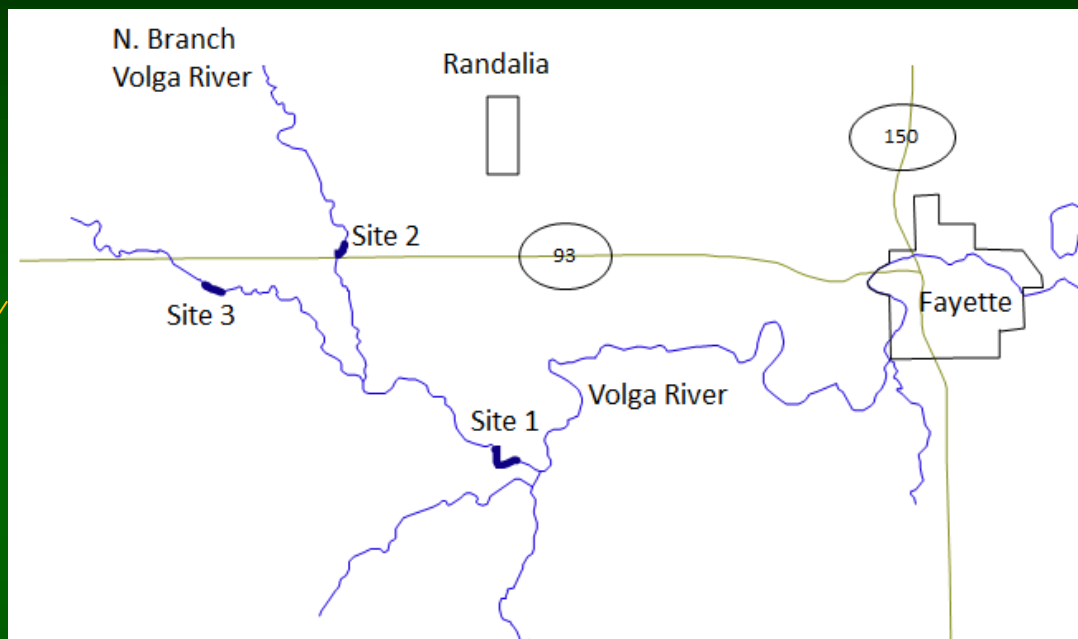
Control Sites

Drainage Area (mi.²)

Site 1 – 54

2 – 25

3 – 22

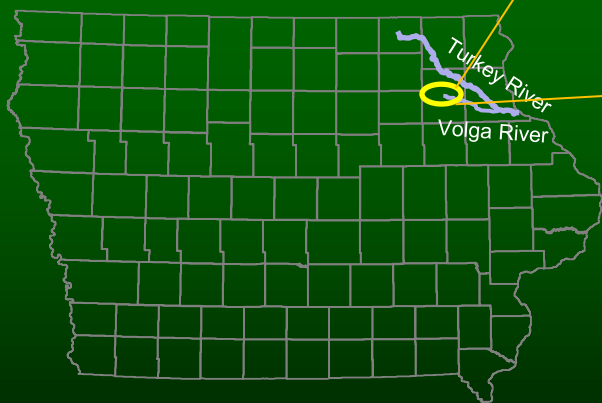


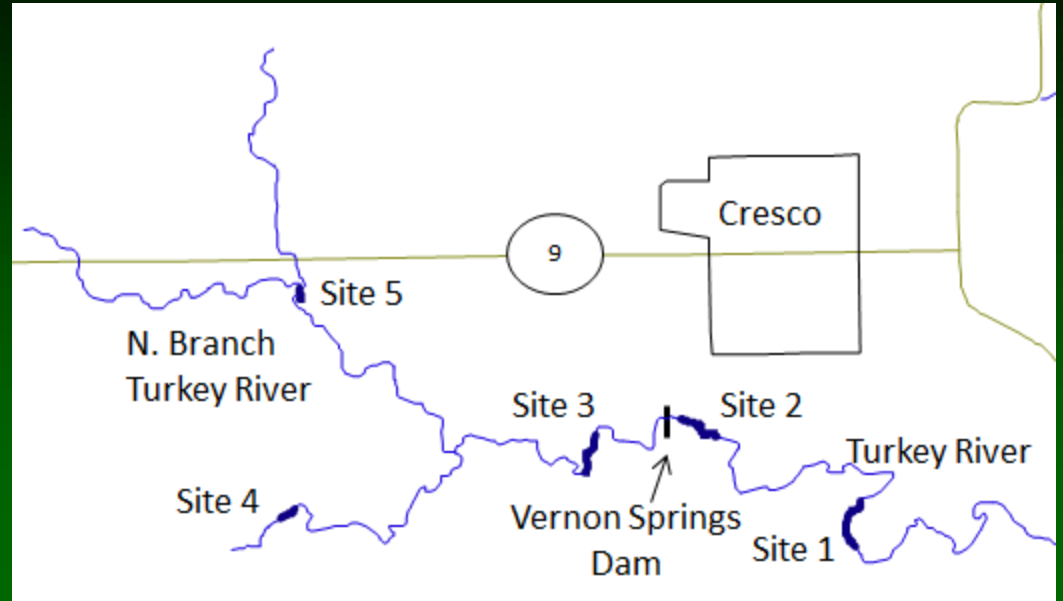
Distance sampled (feet)

Site 1 – 2020

2 – 1010

3 – 900





Fish Community Sampling



Fish Marking



Fish were marked downstream of the dam in 2008, 2009, and 2010

Pelvic fin clips – most fish

Third and fourth dorsal spine – Walleye and Centrarchids

Fish Community Samples

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	X		X		X	X
	2	X		X		X	X
	3	X		X		X	X
	4		X	X	X	X	X
	5		X	X	X	X	X
Volga	1			X	X	X	X
	2			X	X	X	X
	3			X	X	X	X

Red line separates pre-project and post-project samples.

Marked Fish Below Vernon Springs Dam



Species	Number Marked
Black Redhorse	1157
Golden Redhorse	813
White Sucker	799
Northern Hog Sucker	310
Quillback Carpsucker	222
Rock Bass	184
Black Bullhead	101
Walleye	96
Common Shiner	60
Smallmouth Bass	58
Horneyhead Chub	42
Stoneroller	40
Creek Chub	15
Northern Pike	14
Largemouth Bass	12
Common Carp	8
Green Sunfish	7
Bluegill	5
Black Crappie	4
White Crappie	3
Stonecat	1
Total	3951

Marked Fish Recaptured Upstream of Dam



16 Black Redhorse
11 Golden Redhorse
3 Walleye
1 Northern Hog Sucker

31 Total

One Black Redhorse recaptured at Site 5



Total Number of Species

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	30		33		22	25
	2	35		31		25	28
	3	29		26		22	25
	4		23	22	20	24	24
	5		25	24	29	27	29
Volga	1			28	32	31	29
	2			26	25	22	27
	3			33	33	32	30

Index of Biotic Integrity (IBI) Scores

River	Site	Year				
		2009	2010	2011	2013	2014
Turkey	4	72	69	69	75	73
	5	63	64	69	79	69
Volga	1		74	82	86	79
	2		72	63	80	77
	3		73	69	77	78

Two species sampled upstream of dam
that were not found pre-project.

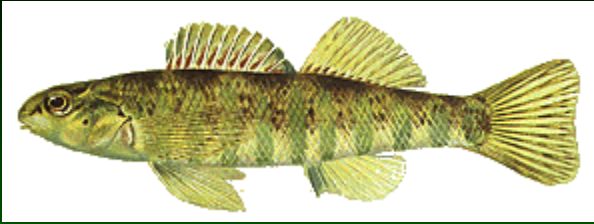
Largescale Stoneroller

Banded Darter

Both species considered Species of Greatest
Conservation Need (SGCN) in the Iowa Wildlife
Action Plan

Number of Largescale Stoneroller

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	0		17		17	21
	2	17		17		55	51
	3	0		0		1	0
	4		0	0	0	0	26
	5		0	0	14	21	59
Volga	1			352	40	63	284
	2			44	9	0	5
	3			146	0	5	135



Number of Banded Darter

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	3		5		0	0
	2	3		8		1	2
	3	0		0		0	0
	4		0	0	0	0	0
	5			0	0	6	2
Volga	1			5	9	15	17
	2			8	1	5	4
	3			14	5	4	7

Four additional species sampled at Site 4 and 5 that were not found pre-project.

Black Redhorse*

Smallmouth Bass

Quillback Carpsucker

Largemouth Bass

*Threatened species in Iowa



Number of Black Redhorse

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	160		110		119	111
	2	300		142		132	131
	3	7		23		62	63
	4		0	0	0	3	3
	5		0	0	4	67	36
Volga	1			34	44	154	73
	2			4	0	10	2
	3			6	3	5	3



Number of Smallmouth Bass

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	9		6		11	8
	2	30		16		19	14
	3	10		6		10	7
	4		0	0	0	2	0
	5			0	0	4	5
Volga	1			19	71	61	32
	2			4	6	11	13
	3			1	12	4	7



Number of Quillback Carpsucker

River	Site	Year					
		2008	2009	2010	2011	2013	2014
Turkey	1	5		11	10		1
	2	26		49	2		4
	3	9		0	1		3
	4		0	0	2	0	0
	5		0	0	5	0	0
Volga	1			1	3	4	2
	2			0	0	1	0
	3			0	2	0	0

Preliminary Conclusions

Rock-arch rapids structure is providing upstream fish passage for several fish species.

Rock-arch rapids construction allowed recolonization of upstream sites by largescale stoneroller and banded darter.

Construction of rock arch rapids appeared to improve Black Redhorse and Smallmouth Bass populations upstream of the structure.

Continued monitoring will help determine the long term effects of dam modification on the fish community in the Turkey River.



Special Thanks

Decorah Fish Management Team
Howard County Conservation Board

